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COLOR SELECTING MECHANISM IN A CATHODE RAY TUBE

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[There are no amendments to this patent.]

Abstract

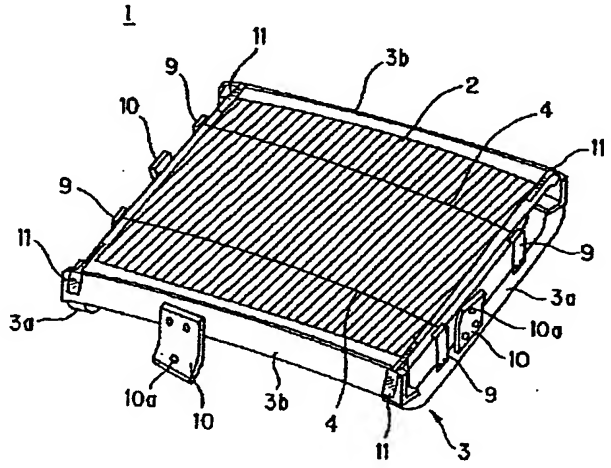
Problem

To constantly maintain an elastically contacting state of damper members with tape shaped grid pieces, which make up an aperture grill.

Means to solve

It [the color selecting mechanism] is equipped with an aperture grill consisting of an aperture grill frame which displays the entire frame form, several tape-shaped grid pieces that

make up electron beam selecting slits, and a supporting part in a frame form which supports these grid pieces; damper members in the form of wires that are mounted along the aperture grill in a manner so that they elastically contact the grill pieces and both ends of supporting pieces of the supporting part in an orthogonal state; and elastic members which are attached to the aperture grill frame and press the supporting pieces in a direction so that they separate from the damper members, and the elastic members correct a state of deformation generated in the supporting pieces by elastic members.



Diagonally viewed diagram of the color selecting mechanism

Claims

1. A color selecting mechanism in a cathode ray tube characterized by being equipped with an aperture grill consisting of an aperture grill frame which displays the entire frame form,

several tape-shaped grid pieces that make up electron beam selecting slits, and a supporting part in a frame form which supports these grid pieces;

damper members in the form of wires that are mounted along the aforementioned aperture grill in a manner so that they elastically contact the aforementioned grill pieces and both ends of supporting pieces of the aforementioned supporting part in an orthogonal state;

and elastic members which are attached to the aforementioned aperture grill frame and press the aforementioned supporting pieces in a direction such that they separate from the aforementioned damper members,

and the construction is such that the aforementioned elastic members correct the deformed state generated in the aforementioned supporting pieces, and the elastically contacting state of the aforementioned damper members with the aforementioned grid pieces is maintained.

2. The color selecting mechanism in a cathode ray tube described in Claim 1 characterized by the aforementioned elastic members being attached to the right and left beam frame members, which make up the aforementioned aperture grill frame, in a cantilevered state.

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To constantly maintain an elastically contacting state of damper members with tape shaped grid pieces, which make up an aperture grill.

Means to solve

It [the color selecting mechanism] is equipped with an aperture grill consisting of an aperture grill frame which displays the entire frame form, several tape-shaped grid pieces that

3. The color selecting mechanism in a cathode ray tube described in Claim 1 characterized by the aforementioned elastic members being attached to the upper and lower beam frame members, which make up the aforementioned aperture grill frame, in a cantilevered state.

Detailed explanation of the invention

[0001]

Technical field of the invention

This invention concerns a color selecting mechanism in a cathode ray tube for color television receivers and color monitor systems, for example. In more detail, it concerns a color selecting mechanism in a cathode ray tube that is equipped with an aperture grill.

[0002]

Prior art

A cathode ray tube is equipped with a color selecting mechanism, which controls electron beams that are emitted from an electron gun and guides them to individual phosphors on the phosphor screen. As this color selecting mechanism, a type has been offered, which consists of an aperture grill, in which many small openings (apertures) in the shape of a vertical stripe are formed, and an aperture grill frame, which supports this aperture grill.

[0003]

A conventional color selecting mechanism (100) as shown in Figure 8 consists of an aperture grill (101), an aperture grill frame (102) that supports this aperture grill (101), and damper wires (103) that stop vibrations of the aperture grill (101).

[0004]

In the aperture grill (101), many tape shaped grid pieces (will be referred to as tapes below) (105) are formed by constructing many small openings in the shape of a vertical stripe (will be referred to as slits below) (104) by etching a thin soft steel plate, for example, and a frame shaped supporting part (106), which supports these tapes (105), is formed.

[0005]

In the aperture grill (101), as shown in Figure 9, an extra slit (104a) is formed between the supporting piece at each side (will be referred to as the supporting tape below) (106a) that is parallel to tapes (105) and the end slit (104b), which makes up the effective screen region (107)

when integrated into the front screen panel of a cathode ray tube, for assuring the slit width in this end area. The extra slit (104a) includes the end tape (105a) and the supporting tape (106a).

[0006]

The aperture grill frame (102), as shown in Figure 8, is formed while displaying the entire frame form, in which a pair of upper and lower beam frame members (102b) and (102b) are connected to a pair of right and left vertical frame members (102a) (102a).

[0007]

Wire attaching springs (108) for fixing damper wires (103) are respectively attached at 2 upper and lower locations at the outer side face of each vertical frame member (102a) of the aperture grill frame (102). The lower end part of the wire attaching spring (108) is attached to the vertical frame member (102a), and a damper wire (103) is attached at the upper end part. A damper wire (103) is attached to the wire attaching spring (108) in a slightly stretched state, as will be described later.

[0008]

A plate spring (109) for fixing and supporting upon integration into the front screen panel of a cathode ray tube, which is not shown in the illustration, is attached in the aperture grill frame (102) at outer side faces of the right and left vertical frame members (102a) and at the lower side beam frame member (102b), for example.

[0009]

Each end of a damper wire (103) is attached to a wire attaching spring (108) of a vertical frame member (102a) in a manner orthogonal to the tapes (105) and the supporting tapes (106a). A total of two upper and lower damper wires (103) are mounted over the aperture grill (101), and they have elastic contact at 2 upper and lower locations of the tapes (105) and the supporting tape (106a).

[0010]

In a conventional color selecting mechanism with the structure above (100), the aperture grill is attached to the aperture grill frame (102) as shown in Figure 9 in a manner such that it follows the reference virtual curved surface (110) with a uniform curvature on the surface. In the color selecting mechanism (100), all tapes (105) that make up this aperture grill (101) have elastic contact with the damper wires (103) as shown in Figure 10 when the aperture grill (101)

has a small curvature. Accordingly, in the color selecting mechanism (100), vibration generated in the tapes (105) is stopped by the elasticity of the damper wires (103).

[0011]

Problem to be solved by the invention

A conventional color selecting mechanism (100) is designed so that the surface of the aperture grill (101) follows a reference virtual curved surface (110) having a uniform curvature described above. However, the color selecting mechanism (100) generates deformation as shown in Figure 11 wherein separation occurs from the ideal reference virtual curved surface (110) when a graphing processing, for example, for increasing the absorption rate of the aperture grill (101) for external light and improving the contrast is implemented.

[0012]

Accordingly, in a conventional color selecting mechanism (100), the aperture grill (101) is provided with an extra slit (104a) for assuring the slit width in the end area of the effective screen region (107) (end slit (104b)) when it is integrated into the front face panel of the cathode ray tube, as described above. The color selecting mechanism (100) has a mechanism which assures the end slit (104b), which makes up the end part of the effective screen region (107) when integrated into the front face panel of the cathode ray tube, even if the supporting tape (106a) is deformed, which deforms the extra slit (104a).

[0013]

However, in the conventional color selecting mechanism (100) as shown in Figure 12, when the supporting tape (106a) deforms, the tapes (105) move in a direction where an elastic contacting state with the damper wires (103) cannot be maintained, and a so-called damper lifting phenomenon is often displayed.

[0014]

More precisely, in the color selecting mechanism (100) as shown in Figure 13, the deformed supporting tape (106a) pushes up the damper wires (103), and tapes (105), which are in the effective screen region (107), do not touch this damper wire (103). The color selecting mechanism (100) does not have a sufficient damping effect when tapes (105) do not contact the damper wire (103), tapes (105) near the supporting tape (106a) as well as the supporting tape (106a) itself begin to vibrate, and the entire aperture grill (101) vibrates.

[0015]

The color selecting mechanism (100) has a problem of the generation of a color dislocation in the cathode ray tube when the aperture grill (101) vibrates and electron beams do not hit specific phosphors. Accordingly, assembling of the aperture grill (101) into the front panel near the extra slit (104a) and supporting tape (106a) had to be done carefully while confirming the variation amount in a conventional color selecting mechanism (100).

[0016]

Furthermore, the cathode ray tube has tended to become more flattened in conventional color selecting mechanisms (100), and the aperture grill (101) also flattens to match this cathode ray tube. As a result, tapes (105) in the color selecting mechanism (100) easily separate from the damper wires (103), and the aperture grill (101) is easily vibrated.

[0017]

As described above, it is particularly necessary to pay attention to the deformation of the supporting tapes (105) in the color selecting mechanism (100). In the color selecting mechanism (100), when a tape (105) maintains an elastically contacting state with the damper wires (103) even though the supporting tape (106a) is not positioned on an ideal reference virtual curved surface (110), the aperture grill (101) does not vibrate through deformation of the supporting tape (106a).

[0018]

Accordingly, this invention has been proposed with the objective of offering a color selecting mechanism in a cathode ray tube, in which the elastically contacting state of the damper members with the tape shaped grid pieces that make up the aperture grill is maintained.

[0019]

Means to solve the problem

The color selecting mechanism in a cathode ray tube in this invention for attaining this objective is equipped with an aperture grill consisting of an aperture grill frame which displays the entire frame form, several tape shaped grid pieces that make up electron beam selecting slits, and a supporting part in a frame form which supports these grid pieces; damper members in the form of wires that are mounted along the aperture grill in a manner so that they elastically contact in an orthogonal state the grid pieces and both ends of supporting pieces of the supporting part; and elastic members which are attached to the aperture grill frame and press the supporting pieces in a direction such that they separate from the damper members.

[0020]

In the color selecting mechanism in a cathode ray tube in this invention structured as above, the deformation generated in the supporting piece area is corrected by the elastic members, and the elastically contacting state of the aforementioned damper members with the grid pieces is constantly maintained. Accordingly, vibration generated at the aperture grill is reliably controlled in the color selecting mechanism, and guiding of electron beams that are emitted from an electron gun into individual phosphors on the phosphor screen can be accurately controlled.

[0021]

Embodiment of the invention

An embodiment of the invention will be explained while referring to figures below. As shown in Figure 1, a color selecting mechanism (1) indicated as an embodiment of this invention consists of an aperture grill (2), an aperture grill frame (3) which supports this aperture grill (2), and damper wires (4) that stop vibration that is generated in the aperture grill (2).

[0022]

In the aperture grill (2), many tape shaped grid pieces (will be referred to as tapes below) (6) are formed by constructing many small vertical stripe shaped openings (will be referred to as slits below) (5) by etching a thin soft steel plate, for example, and a frame shaped supporting part (7) which supports these tapes (6) is formed.

[0023]

In the aperture grill (2), as shown in Figure 2, an extra slit (5a) which assures the slit width of the end part is formed between the supporting piece at each side (will be referred to as supporting tape below) (7a) that is parallel to tapes (6) and the end slit (5b), which makes up the effective screen region (8) when integrated into the front panel of a cathode ray tube. The extra slit (5a) includes the end tape (6a) and the supporting tape (7a).

[0024]

The aperture grill frame (3), as shown in Figure 1, displays the entire frame form, in which a pair of upper and lower beam frame members (3b) and (3b) are connected to a pair of right and left vertical frame members (3a) and (3a), and the front face is formed in a cylindrical face (cylindrical face) so that the surface of an assembled aperture grill (2) has a uniform curvature.

[0025]

In the aperture grill frame (3), wire attaching springs (9) for fixing damper wires (4) are attached at 2 upper and lower spots at the outer side faces of the vertical frame member (3a). A wire attaching spring (9) is fixed to the vertical frame member (3a) at the lower end part by spot welding, for example, and a damper wire (4) is attached at the upper end part. The damper wire (4) is attached to the wire attaching spring (9) in a slightly stretched state, which will be described later.

[0026]

Plate springs (10) for fixing and supporting upon integration into the front panel of a cathode ray tube, which is not shown in the illustration, are attached at outer side faces of the right and left vertical frame members (3a) and at the lower side beam frame member (3b), for example, in the aperture grill frame (3). A plate spring (10) is bent and formed in nearly a letter he [Japanese hiragana character] shape. One end is spot welded to each side of the aperture grill frame (3), and attached in a cantilevered state so that the other end projects to the outside. A plate spring (10) is provided with an engagement hole (10a) that corresponds to a panel pin provided at the front panel of a cathode ray tube, which is omitted in the illustration. Accordingly, the color selecting mechanism (1) is assembled into the front panel by relative engagement of engagement holes (10a) of the plate springs (10) provided at the aperture grill frame (3) with the panel pins.

[0027]

In the aperture grill frame (3), in positioning at the outer side faces of the upper and lower beam frame members (3b) arranged over the extension line of a supporting tape (7a) when the aperture grill (2) is assembled, supporting springs (11) are respectively attached in a cantilevered state at 4 corners of this aperture grill frame (3). A supporting spring (11) is made of a metallic material, such as aluminum or stainless steel, for example, that is a material having sufficient elasticity for pressing the supporting tape (7a) in a direction that separates from a damper wire (4). A supporting spring (11), as shown in Figure 3, consists of a piece (11a), which is horizontal to the aperture grill (2), and a piece (11b), which is vertical to it, and they have a shape similar to the letter L. The piece (11a) of the supporting spring (11) has elastic contact with the upper face of the supporting tape (7a) by the formation of a projection part (11c) at the contacting side of the supporting tape (7a). The piece (11b) of the supporting spring (11) is fixed to the vertical frame member (3a) by spot welding, for example.

[0028]

The damper wires (4) are attached to the wire attaching springs (9) of the vertical frame member (3a) at both ends in a manner so that they are orthogonal to the tapes (6) and the supporting tapes (7a), as shown in Figures 1 and 2. Two upper and lower damper wires (4) are mounted at the aperture grill (2), and they have elastic contact with two upper and lower locations of the tapes (6) and of the supporting tapes (7a).

[0029]

The color selecting mechanism (1) with the structure above is attached to the aperture grill frame (3) by welding, for example, in a manner so that a specific tension is applied to the aperture grill (2). The color selecting mechanism (1) is fixed in a manner so that a specific tension is applied to the aperture grill (2), and stretching of the aperture grill (2) by change in temperature is absorbed.

[0030]

The aperture grill (2) is also attached at the front face of the color selecting mechanism (1) along the front face of the aperture grill frame (3). In the color selecting mechanism (1), all tapes (6) that make up this aperture grill (2) have elastic contact with the damper wires (4) when the aperture grill (2) possesses a small curvature, as shown in Figure 2. Accordingly, application of vibration to the tapes (6) in the color selecting mechanism (1) is prevented by the elasticity of the damper wires (4).

[0031]

In the color selecting mechanism (1), as shown in Figure 4, the supporting spring (11) presses the supporting tape (7a) in a direction such that it separates from a damper wire (4) through the projection part (11c). In the color selecting mechanism (1), the supporting spring (11) prevents the supporting tape (106a) from deforming in a direction that pushes up a damper wire (4), and all tapes (105) maintain contact with the damper wires (103) [sic; (4)].

[0032]

Accordingly, in the color selecting mechanism (1), as shown in Figure 5, deformation of the supporting tape (7a) is corrected by the supporting spring (11), and the elastic contacting state of a damper wire (4) with tapes (6) is constantly maintained, and the aperture grill (2) follows an ideal reference virtual curved face (13). In the color selecting mechanism (1), vibration generated at the aperture grill (2) can be reliably controlled, and an accurate control can

be provided when guiding electron beams that are emitted from an electron gun in a cathode ray tube into each phosphor on the phosphor screen.

[0033]

The color selecting mechanism (1) is not limited only to said structure. The color selecting mechanism (1) may have a structure, in which supporting springs (12) are attached in a cantilevered state at 2 spots at outer side faces positioned at the central part of the right and left vertical frame members (3a), which make up the aperture grill frame (3), as shown in Figure 6.

[0034]

The supporting spring (12) is formed of the same material as the supporting spring (11) described above. The supporting spring (12), as shown in Figure 7, nearly has a letter T shape, and it consists of a piece (12a) which is horizontal to the aperture grill (2), and a piece (12b) which is vertical to it, and they display said shape that is similar to the letter T. In the supporting spring (12), the piece (12a) is provided, and projection parts (12c) are respectively provided at both end parts at the contacting side of the supporting tape (7a), and they elastically contact the upper face of the supporting tape (7a). The piece (12b) of the supporting spring (12) is fixed to the vertical frame member (3a) by spot welding, for example.

[0035]

The number of supporting springs (11) and (12) that are attached in the color selecting mechanism (1) is not limited, and a sufficient number may be used for contact of the damper wires (4) with all tapes (6) that make up the aperture grill (2), for example. The color selecting mechanism (1) may also have a structure, in which supporting springs (11) and (12) are used together.

[0036]

Effect of the invention

As explained in detail above, the color selecting mechanism of a cathode ray tube in this invention has a structure in which an elastic member that presses a supporting piece in a direction that separates it from a damper member is attached to the aperture grill frame. Therefore, the deformation state generated in the supporting piece can be corrected by the elastic member, and the elastically contacting state of damper members with the grid pieces can be constantly maintained. Accordingly, vibration that is generated in the aperture grill can be reliably controlled, and accurate control is attained in guiding electron beams that are emitted

from an electron gun in a cathode ray tube into each phosphor on the phosphor screen, and color irregularity that occurs in the cathode rays can be prevented.

Brief description of the figures

Figure 1 is a diagonally viewed diagram, which explains the structure of a color selecting mechanism indicated as an embodiment of this invention.

Figure 2 is a vertical cross-sectional diagram of a major part indicating the structure of said color selecting mechanism.

Figure 3 is a side view diagram of a major part of said color selecting mechanism.

Figure 4 is a vertical cross-sectional diagram of a major part indicating the structure of said color selecting mechanism.

Figure 5 is a cross-sectional diagram of a major part, which explains the state of the aperture, which makes up said color selecting mechanism.

Figure 6 is a diagonally viewed diagram, which explains another structure of said selecting mechanism.

Figure 7 is a side view diagram of a major part of the other said color selecting mechanism.

Figure 8 is a diagonally viewed diagram, which explains the structure of a conventional color selecting mechanism.

Figure 9 is a vertical cross-sectional diagram of a major part, which explains the state of the aperture which makes up said color selecting mechanism.

Figure 10 is a cross-sectional diagram indicating the structure of said selecting mechanism.

Figure 11 is a cross-sectional diagram, which explains the state of the aperture grill which makes up said color selecting mechanism.

Figure 12 is a cross-sectional diagram, which explains the state of deformation of the supporting tape, which makes up the aperture grill of said color selecting mechanism.

Figure 13 is a cross-sectional diagram, which explains the state of deformation of the supporting tape, which makes up the aperture grill of said color selecting mechanism.

Explanation of symbols

1. Color selecting mechanism, 2. aperture grill, 3. aperture grill frame, 4. damper wire, 5. slit, 5a. extra slit, 5b. end slit, 6. tape, 6a. end tape, 7a. supporting tape, 11. supporting spring attached to the upper and lower beam frame members, 12. supporting spring attached to the right and left beam frame members.

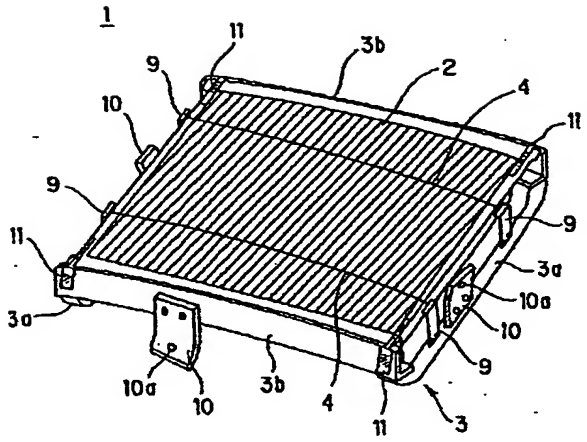

Figure 1. Diagonally viewed diagram of the color selecting mechanism

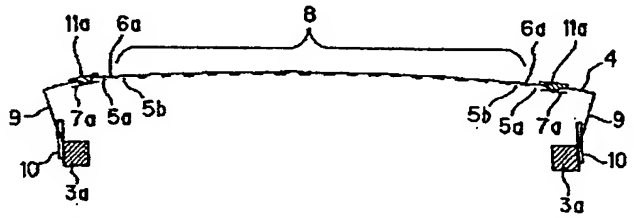

Figure 2. Cross-sectional diagram of a major part of the color selecting mechanism

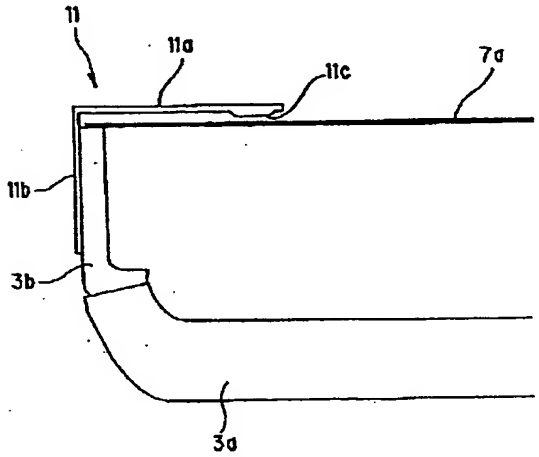

Figure 3. Side view diagram of a major part of the color selecting mechanism

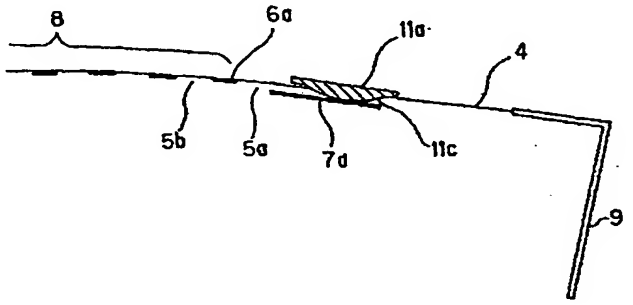

Figure 4. Vertical cross-sectional diagram of a major part of the color selecting mechanism

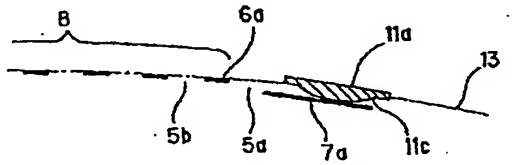

Figure 5. Cross-sectional diagram of a major part indicating the state of the aperture grill

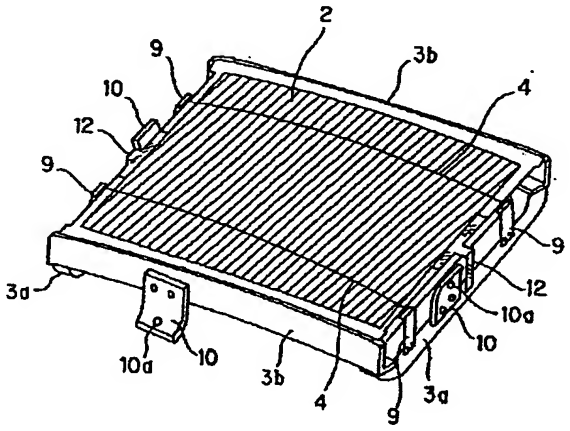

Figure 6. Diagonally viewed diagram of another color selecting mechanism

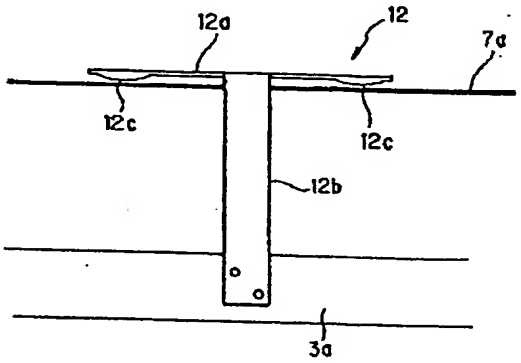

Figure 7. Side view diagram of a major part of the other color selecting mechanism

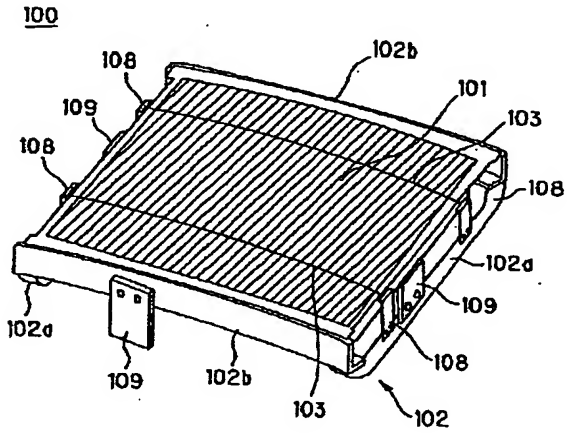

Figure 8. Diagonally viewed diagram of a conventional color selecting mechanism

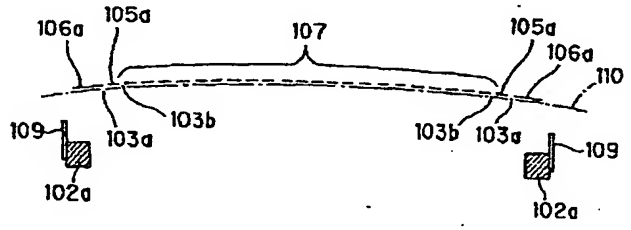

Figure 9. Vertical cross-sectional diagram of a major part indicating the state of a conventional aperture grill

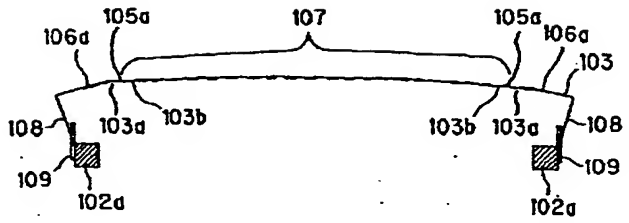

Figure 10. Cross-sectional diagram of a conventional color selecting mechanism

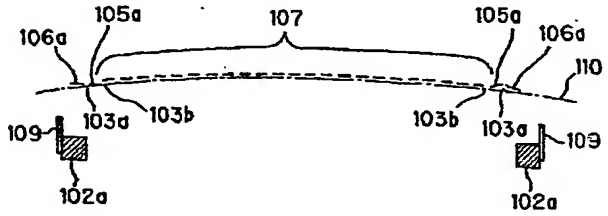

Figure 11. Cross-sectional diagram indicating a state of a conventional aperture grill

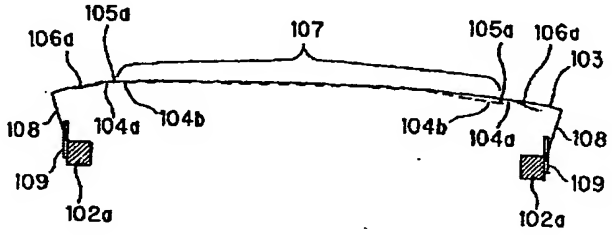

Figure 12. Cross-sectional diagram, which explains the state of deformation of the supporting tape, which makes up the conventional aperture grill

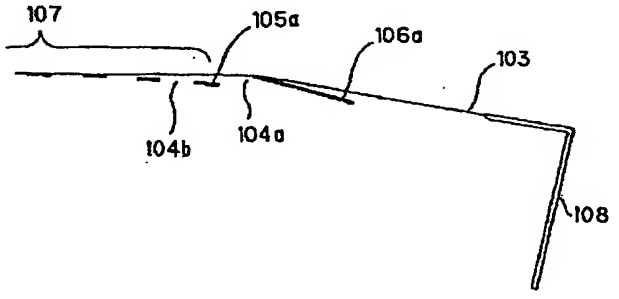

Figure 13. Cross-sectional diagram of a major part, which explains the state of deformation of the supporting tape